A Note from the Chair

Reid Cooper
Brown University

Dear Friends,

The PPEM Community has much to celebrate this year as we gather for our annual dinner at AGU this December. A number of our colleagues have received special recognition for their professional contributions to the geosciences: David Kohlstedt receives the 2003 Harry H. Hess Medal of AGU and AGU Fellow status has been awarded to David Lockner and Terry Tullis (Class of 2002; sorry this didn’t make it into last-year’s newsletter) and to Bill Durham and Ian Jackson (Class of 2003). Please make every effort to attend the dinner meeting at Destino’s in order to recognize and congratulate these honorees!

PPEM’s Fine-Dining Team—Brian Bonner and Bill Durham—have again worked their wonders to scope out for us a special place to meet and eat; as ever, the PPEM community is thankful for their efforts. Thanks, too, go to Andreas Kronenberg, Nick Beeler and Georg Dresen for their efforts in maintaining the web site, maintaining the membership roster and treasury and editing the newsletter, respectively.

With regard to the dinner meeting, we will be tending back to our “roots” a bit in 2003. Specifically, we have selected a smaller venue than in the past several years; consequently, there will be a strict limit on the seating available (60 persons). The decision to scale back in size was not made lightly—we would rather not be excluding folks—but both the fellowship of the event and the choices of venue were both being compromised as our numbers started to exceed 100. Also, in addition to the toasts (at least!) to our honorees this year, we will reprise a small business meeting.

One order of business is the election of four new members of the PPEM Steering Committee. The present Committee will present a slate of four candidates; others may be nominated from the floor. At present, the Committee consists of Ian Main, Dan Moos and BJ Wanamaker (terms ending December 2003), Jack Dvorkin, Pat Berge and Sharon Webb (terms ending December 2004), and Chris Marone (term ending December 2005); I will rotate off as chair of the committee in December 2004. Anyone interested in nominating new members, or in volunteering, to serve a three-year term should feel free to contact any of the present Committee members. Too, the Committee solicits ideas concerning initiatives of interest to the physical properties community.

Special thanks go to Ian, Dan and BJ for their soon-to-be-completed service on the Steering Committee.

(continued on page 5)

PPEM 2003 Dinner

Bill Durham
Brian Bonner
Lawrence Livermore National Laboratory

Dear Friends and Colleagues,

Please join us for our annual Physical Properties of Earth Materials (PPEM) dinner at the 2003 Fall AGU meeting, this year at a trendy and critically acclaimed Latin American restaurant in the Castro district of SF. (You’ll have to take the trolley).

Please pass this invitation along to PPEM-oriented colleagues. Our mailing list may not be all-inclusive.

Official announcement and information below. Please note the reservation deadline of November 21, and the seating limit of 60 persons.

We look forward to seeing you there.

Bill Durham
Brian Bonner

(Continued on page 8)
PPEM Members

Mike Blanpied

USGS, Menlo Park

Thanks to the many of you who sent corrections to the PPEM membership and contact database, and for those who sent names and addresses for new members.

I have turned over my PPEM duties to Nick Beeler. Henceforth he will maintain the emailing list of PPEM members, and will handle the bank account. Change-of-address and add-member requests should go to Nick.

http://geoweb.tamu.edu/tectono/ppem/PPEMembers.html

A warm welcome to those who are new to the PPEM (Physical Properties of Earth Materials) community. The PPEM web site offers a summary of the why's and wherefore's of the group, and other handy information.

http://geoweb.tamu.edu/tectono/ppem/

Cheers,
Mike Blanpied

Special Sessions at Fall AGU 2003

(H13) INTERACTIONS BETWEEN FLUIDS AND FRACTURES
Convenors:
Lawrence C Murdoch (Clemson University); Leonid Germanovich (Georgia Tech)

(P04) FAULTING AND FAULT-RELATED PROCESSES ON PLANETARY SURFACES
Convenors:
David A. Ferrill (CNWRA); Richard A. Schultz (University of Nevada, Reno); Robert T. Pappalardo (University of Colorado, Boulder)

(S05) STRESS TRANSFER, TRIGGERED EARTHQUAKES, AND TIME-DEPENDENT SEISMIC HAZARD
Convenors:
Sandy Steacey (University of Ulster); Joan Gomberg (US Geological

(S07) CRUSTAL SEISMIC ANISOTROPY AS A MEASURE OF TECTONIC DEFORMATION
Convenors:
David Okaya (Univ. Southern California); Nick Christensen (Univ. Wisconsin)

(S15) MECHANICAL STRENGTH OF THE CONTINENTAL LITHOSPHERE
Convenors:
Wang-Ping Chen (University of Illinois, Urbana-Champaign); Brian Evans (Massachusetts Institute of Technology)

(S17) THEORIES OF EARTH'S INTERIOR
Convenors:
Raymond Jeanloz (University of California, Berkeley); Miaki Ishii (Harvard University)

(T09) DEVELOPMENT OF FAULT SYSTEMS THROUGH TIME: PROCESS AND RATES
Convenors:
Jonathan Mark Bull (Southampton Oceanography Centre); Patience Cowie (Edinburgh University); Nancy Dawers (Tulane University)

(T10) STRUCTURE AND DYNAMICS OF OCEANIC UPPER MANTLE
Convenors:
Jim Gaherty (Georgia Institute of Technology); Jun Korenaga (Yale University); Shijie Zhong (University of Colorado)

(T11) AT THE SEISMOGENIC FRONT: DYNAMIC PROCESSES AT CONVERGENT MARGINS
Convenors:
Harold Tobin, Susan Bilek (New Mexico Tech); Kohtaro Ujiie (IFREE/JAMSTEC); Demian Saffer (University of Wyoming)

(T17) THE STRUCTURE AND PHYSICAL PROPERTIES OF GRAIN BOUNDARIES IN ROCKS
Convenors:
George H. Dresen, Richard Wirth (GeoForschungsZentrum Potsdam); David L. Kohlstedt (University of Minnesota)

(V17) NEW FRONTIERS IN HIGH-PRESSURE RESEARCH
Convenors:
Yanbin Wang, Guoyin Shen (GSECARS, University of Chicago)

(V18) STATE OF THE ART IN THEORY OF MATERIALS: METHODS AND APPLICATIONS
Convenors:
Ronald Cohen (Geophysical Laboratory, Carnegie Institution of Washington); Gerd Steinle-Neumann (Bayerisches Geoinstitut), Bjorn Winkler Johann (Wolfgang Goethe-Universität Frankfurt)

New Departures in Structural Geology and Tectonics

Andreas Kronenberg

Texas A&M

Last September, 2002, David Pollard convened a workshop in
Denver, co sponsored by NSF to re-examine research, instrumentation, and educational needs and opportunities in Structural Geology and Tectonics. Discussions at the workshop were lively and an outline of viewpoints and conclusions were presented at the following GSA Meeting for additional input.

In particular, I was encouraged to find how many participants felt that vigorous research of physical properties and mechanics is essential to advancing our understanding in a wide range of research areas. The discussions focussed on just a few research topics that were seen as examples of new opportunities, but there are many others that participant recognized. We also addressed educational and instrumentation needs for a healthy future.

The results of this workshop are now posted as a white paper on "New Departures in Structural Geology and Tectonics" at http://pangea.stanford.edu/%7Edpollard/NSF/main.html

I know that members of PPEM have a lot to contribute to research areas identified in this white paper, and I hope that you find the time to look it over. NSF has generously sponsored this workshop, and ultimately it will be judged only by its influence on future research and teaching. It is certainly appropriate to refer to it in your future NSF proposals if your particular research bears on broad questions in this white paper. If you would like a printout, you can download the white paper as a PDF file – scroll down to the bottom of the right panel.

The 2004 Gordon Research Conference on Rock Deformation: Role of Water in Rock Deformation

Mount Holyoke College
South Hadley, Massachusetts
August 8-13

Andreas Kronenberg
Mark Jessell
1) Texas A&M
2) Universite Paul-Sabatier, Toulouse

The dynamic nature of the solid Earth depends in large part on interactions with fluids. Just as water facilitates mass transport, speeds up reaction kinetics, and promotes melting of silicates, water assists in the fracture, friction, and flow of rocks. Stresses required for deformation are depressed by a number of fluid-rock interactions with implications for tectonics, slip and stability of faults, diagenesis, and creep in the mantle. The next Gordon Conference on Rock Deformation, scheduled for this summer at Mount Holyoke College will examine the physics and chemistry of failure and flow of rocks when aqueous fluids are present and explore the consequences for mechanical properties of offshore sediments, faults, lithosphere, and deep mantle of a wet Earth.

Water weakening means different things to different investigators. From the earliest studies of effective stress and thin-skinned overthrusts, we have known that pore pressures are extremely important to the conditions for brittle failure and faulting. Deformation by stress-induced dissolution and mass transfer was described earlier than any other deformation mechanism in rocks. Crystal plasticity and creep of quartz and olivine have long been known to depend on water defects in the crystalline interior. With further study, our appreciation of the role of water in rock deformation has been extended and reinforced. Advances have been made by investigations of poroelastic coupling in fault zones, fluid-assisted crack growth, crack healing and sealing. Significant progress has been made in studies of solution transfer and diffusion creep, dislocation creep of a wide range of crustal and mantle silicates with trace hydrous defects, frictional sliding on dry and hydrated surfaces, and reaction weakening where synchronous deformation and reaction are assisted by fluids. In many cases, the effects of water on deformation processes are profound, so much so that they may define the rheological character of oceanic and continental lithosphere, the yielding of sediments and slip in accretionary prisms, and the seismic character of subduction zones.

What would the Earth's solid surface look like without water? Some say Venus. Some might look to the Moon. Yet, after so many studies of water weakening on Earth, we still have many important questions to answer. What is the hydrology of faults? What are the sources of fluids in faults and mylonites? Can we model changing populations of microcracks in faulted and deformed rocks based on the kinetics of crack growth, healing and sealing? Are fluid overpressures universal in fault systems? How does compaction and fluid flow govern effective...
pressures and localized slip in accretionary prisms? How much water is expelled in these collisional settings and how much water enters the deep mantle? What is the fundamental process of water weakening in quartz and other framework silicates? Is it the same as has been resolved for olivine? What does pore pressure mean when the fluid film between grains is 2 molecules thick? What conditions lead to the persistence of thin fluid films between loaded grains and how are these conditions related to the occurrence of pressure solution? Are rate constants of friction laws ultimately rooted in reaction rate constants between solid and fluid at points of true contact? How can we describe the mechanical response of a reacting system? What conditions lead to reaction weakening? A whole new class of hydrous minerals has been discovered that is stable at deep mantle conditions. Their presence and the hydrous defect populations of olivine and high pressure magnesium silicates bear on the water budget of the planet and rheological structure of the mantle. We are just beginning to examine these issues.

We might also ask how many roles water has in rock deformation. From the physical effect of fluids on effective pressure and the chemical effects of fluids on corrosion cracking and dislocation creep, we know that water does have different means of weakening rocks. But is there a myriad of different mechanisms, or can we discover some universal principles that govern water’s influence on silicate properties? How closely linked on a chemical level are the processes of water weakening that affect fracture, friction and flow? Must our explanations of water weakening be mineral-specific and process-specific? For example, is water weakening of quartz and olivine essentially the same if sufficient time is allowed for kinetic barriers to be overcome and point defect equilibrium is achieved? Are either quartz or olivine good models for water weakening of other silicates? Are the chemical processes of silicate-fluid interaction leading to rate-dependent subcritical cracking also important in frictional slip and how do they compare with water weakening during diffusion creep and dislocation creep? Can we discover fundamental processes underlying the many forms of water weakening that will help us generalize our understanding of deformation?

Even with exquisite experimental data and theoretical developments in our understanding of water weakening, we will need to develop good models for water in the Earth if we are to describe the role of water in natural deformation and tectonics. We need to be able to characterize the amounts, fluxes, and forms of water in sediments, faults, and deforming rock masses. What are the sources of fluids, fluid pressures, fluid flow patterns, and forms of water at mineral surfaces and interfaces in different geologic settings, and what are the distributions, solubilities, and diffusivities of hydrous defects at grain boundaries and in crystalline interiors? How does melting influence water contents of residual phases of the mantle? How much water enters the deep mantle at subduction zones? To make progress in these areas, we need help from hydrologists, petrologists, geochemists, materials scientists and mineral physicists.

(Continued on page 6)

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**EURO-Conference on Rock Physics and Geomechanics**

**Scaling Laws in Space and Time**

20 - 23 September 2004

GeoForschungsZentrum Potsdam

Potsdam, Germany

We wish to announce the next in a series of Euro-conferences devoted to Rock Physics and Geomechanics. Since the first meeting of this kind organized in 1998 in Aussois, France, this series of conferences has successfully fostered dialogue between earth scientists from academia and industry interested in rock physics and geomechanics. The theme of the 2004 Euro-conference in Potsdam is *Scaling laws in space and time*. It addresses the problem of how to relate and successfully apply experimental and theoretical findings to the physical and mechanical behaviour of rocks under natural conditions of space and time. We invite papers on any topic related to the conference title but in particular to the following themes:

1. Rock Fracture Mechanics and Creep
2. Fracture Networks and Fracture Statistics
3. Upscaling and Effective Medium Models
4. Geophysical Monitoring of Rock Deformation
5. Integration of Logging, Borehole Testing and Laboratory Experiments
6. Fluid Transport in Rocks: Field Monitoring and Pore-Scale Models

Each Topic will be introduced by invited speakers including Brian Evans (MIT, Cambridge,
As in the preceding conferences the format of the meeting requires to limit the number of participants to about 100. **Abstract deadline is 30 April 2004.**

**Scientific and Organizing Committee - Potsdam 2004:**
Christian David (Université de Cergy-Pontoise, France), Georg Dresen (GFZ Potsdam, Germany), Joanne Fredrich (Sandia National Laboratory, Albuquerque, USA), Rune Holt (SINTEF Petroleum Research, Trondheim, Norway), Axel Makurat (Shell International Exploration and Production, Rijswijk, Netherlands), Sergei Shapiro (FU Berlin, Germany), Ove Stephansson (KTH Stockholm, Sweden), Robert Zimmermann (Imperial College, London, UK).

We look forward to seeing you in Potsdam in 2004!

For pre-registration, abstract submission and further details please visit the conference web page at [http://www.gfz-potsdam.de/EuroConf2004](http://www.gfz-potsdam.de/EuroConf2004) or contact via e-mail:

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dre@gfz-potsdam.de

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**GULF ROCKS 04**

**Rock Mechanics Across Borders & Disciplines**

**June 5 – 9, 2004**

**Adam’s Mark Hotel**

**Houston, Texas**

Join us for the Gulf Rocks ’04, the 6th North American Rock Mechanics Symposium (NARMS), hosted by the American Rock Mechanics Association (ARMA) in association with the Canadian Rock Mechanics Association (CARMA) and La Sociedad Mexicana de Mecánica de Rocas (SMMR) on June 5-9, 2004 in Houston, where a warm welcome awaits you here in the heart of Texas. Houston is a multi-cultural city, the fourth largest in the United States, with close ties to Mexico (se habla espanol) and a major hub for the energy industry.

The symposium will feature the integration of multi-disciplinary topics dealing with the role of rock mechanics in civil engineering projects; mining, petroleum and other natural resource production; and security and risk management.

Diversification of our continent’s energy supply balance has prompted a serious look into offshore hydrates and shallow heavy oils, a tremendous Canadian resource. Deeper formations, whether for storage, mining, or hydro-carbon extraction, bring new issues with higher temperatures and pressure. Assuring the integrity of underground structures and spaces used by humans brings to focus the current resurgence of the importance of soft rocks and shallow horizons in both the energy and defense areas as well as for mineral extraction and underground construction.

Finally, the proliferation of knowledge management tools leads to integration across disciplines and boundaries.

**To submit an abstract:**

Due November 30, 2003
In English
500 words or one page, plus figure if necessary to explain abstract
Include brief description of work performed, significance of results, and how work applies to the field of rock mechanics
Submit electronically by accessing [www.gulfrocks04.com](http://www.gulfrocks04.com), then go to the “Call for Papers” button

**Discipline areas:**
Constitutive Behavior; Drilling and Hole Stability; Environments / Geohazards; Faults / Fractures / Fractured Rock Behavior; Flow Through Porous Media; Foundations and Slope Stability; Geotechnical Engineering / Structures; Insitu Stress, and Geologic Modeling; Mining / Tunneling / Excavations; Pore Pressure and Pressure Seals; Property Characterization & Prediction; Reservoir Geomechanics; Risk and Uncertainty Management; Rock Physics, Dynamics and Seismicity; Underground Storage, and Sequestration; Well Completions and Integrity


**Registration begins November 17, 2003**

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**A Note from the Chair**

*(Continued from page 1)*

Finally, I call to your attention the next Rock Deformation Gordon Conference scheduled for 8-13 August 2004 at Mount Holyoke College in Hadley, MA. Being organized by Andreas Kronenberg
and Mark Jessell, the conference theme is “The Role of Water in Rock Deformation.” Given the advent of new paradigms of understanding of water storage in “anhydrous” minerals since the last time our community focused on the topic, the meeting should prove fascinating. In general, though, I encourage your participation in the (nominally biennial) Gordon Conference, even if a given meeting’s theme is only peripherally related to your research: the Rock Deformation Gordon Conference provides a forum for the PPEM community to explore and debate new ideas and techniques in the understanding of physical properties of rocks and minerals. Maintaining the invitation by the Gordon Foundation to hold our meeting depends on each individual meeting’s attendance and scientific quality.

I hope to see you in San Francisco in December and in Massachusetts next August.

With kind regards,

Reid

The 2004 Gordon Research Conference on Rock Deformation: Role of Water in Rock Deformation
(Continued from page 4)

The goal of the 2004 Gordon Conference on Rock Deformation will be to examine new developments in our understanding of the fundamental processes by which water influences mechanical properties of rocks and the geologic and geophysical implications of water weakening. This conference will feature 21 talks by leading scientists in fields of rock mechanics, tectonics, geochemistry, petrology, mineral physics, and materials science, who will speak to advances in our understanding of water weakening mechanisms, the occurrence of fluids in the Earth, fluid interactions with rocks, and applications to deformation in the Earth. These talks will serve to initiate discussion, both in formal sessions and during afternoons that are reserved for the free exchange of ideas. Two poster sessions are scheduled to allow all participants to present their latest results and ideas. We invite participation by observational, experimental, and theoretical geoscientists from academia, government labs, and industry, and especially by students and postdocs who will carry out future investigations of the questions raised in discussion. A field trip highlighting fluid-assisted deformation will be organized and led by Drs. Scott Johnson and Charles Guidotti (University of Maine) and Mike Williams and Michelle Cooke (University of Massachusetts), just prior to this Gordon Conference.

This conference will be announced in one of the February issues of Science. If you are interested in attending, please apply early as this conference will be limited to 135 participants. Applications to attend can be made on-line at: http://www.grc.org/attend.htm

Updates and scheduling of this conference and field trip will be posted at: http://www.tectonique.net/grc/

and additional information can obtained directly from GRC at: http://www.grc.org/

Mount Holyoke College is easy to reach by way of Logan Airport, Boston, Massachusetts. GRC-Chartered Buses take participants from Logan Airport directly to the Mount Holyoke Campus. Information about the campus, GRC Bus Schedules, and other travel arrangements can be found at: http://www.grc.org/sites/ma/mhc/mhc.htm

For further questions about this conference, please feel free to e-mail the Chairs, Andreas Kronenberg (at kronenberg@geo.tamu.edu), or Mark Jessell (at mjessell@lmtg.uns-tlse.fr). The field trip is optional but will contribute to participants beginning the conference with first-hand observations.

Registration and payment for the field trip will be separate from the Gordon Conference.

Conference Schedule:

**Sunday Evening**
Rheological Structure of the Lithosphere and Water Weakening
Water and the Oceanic Lithosphere (Greg Hirth)
Water and Structure of Continental Lithosphere (James Jackson)

**Monday Morning**
Surface Hydration, Fluid Films, Solute Transport and Deformation
Fracture and Frictional Wear in Vacuum and Corrosive Environments (J Thomas Dickinson)
The Fluid-Crystal Interface and Character of Thin Fluid Films (Jacob Israelachvili)
Mineral-Fluid Interface and Kinetics of Dissolution and Precipitation (Susan Brantley)
Diffusive Mass Transport and Creep in Porous Rocks (Francois Renard)

**Monday Evening**
Poster Session
The Sources, Distribution and Character of Fluids, Fluid Transport, and Hydrous Defects

**Tuesday Morning**
Most of the deformation on Earth is concentrated in relatively narrow high strain zones (e.g., plate boundaries), therefore high strain zones have attracted the attention of structural geologists, geophysicists and geoscientists in general. For this reason we decided to convene a session at the joint EGS-AUG-EUG meeting in Nice 2003 on High Strain Zones (Session TS-20), in order to bring together experimentalists, numerical modelers and field geologists and address questions such as what mechanisms initiate the localization of deformation into narrow zones and what factors control the stabilization of deformation in high strain zones. Presentations ranged from numerical modeling, physical properties (e.g., thermal conductivity, permeability, seismic properties and acoustic emissions), laboratory measurements (e.g. experimental deformation), as well as field studies. Several solicited speakers contributed a general overview on selected topics such as heat transport through fault zones, the role of frictional properties on the localization in faults, the parameters required for a constitutive flow law including the evolution of strength in or a comparison of high-strain zones in nature and experiment. Specific contributions on deformation experiments included the deformation of two-phase rocks to high strains and the role of metamorphic reactions during the deformation of polyphase rocks, as well as the effect of deformation on strain localization in partially molten rocks. The fabric development during deformation in nature and experiment was addressed by several oral and poster contributions. Some promising results were presented on attempts to model the localization of deformation coupled with field or laboratory investigation. From the laboratory point of view, the experimental progress made thanks to the introduction of the torsion technique in rock deformation has provided stimulating input, well documented by the results of the groups from ETH Zürich and GFZ Potsdam. Due to the success of the session, we decided to organize a Special Publication of the Geological Society of London on High Strain Zones, where many of the presentations at the EGU session will be included.
PLACE:
Destino
1815 Market Street (south side of Market St., between Guerrero and Valencia Sts.) (approx 2 mi SW of Moscone Center)
San Francisco
http://www.destinosf.com/ (read the restaurant review at http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/reviews/restaurants/4155244351.DTL&type=food)

TIME:
Monday evening, 8 December 2003
6:00 pm cash bar
7:30 pm dinner

TRANSPORTATION HINTS:
Best bet is to take the F trolley (http://www.transitinfo.org/Sched/MU/F/), which runs the length of Market St. from the Moscone area out to and beyond the restaurant. Descend at Valencia St. and continue down half a block. Trolley runs every 15 minutes, costs $1.25.

MENU:
Picante de Camarones, Tortillas de Casa
Sauteed Tiger Prawns, Spicy Sofrito Purée, House-made Flour Tortilla Chips

Chile Rellenos, Salsa de Chipotle
Poblano Pepper Filled with Ground Sirloin, Sharp Cheddar, Roasted Chipotle Salsa,
Citrus Crème Fraîche

Ensalada de Palmitos
A Medley of Brazilian Hearts of Palms, Jicama,
Golden Raisins, Sliced Papaya

Arepas con Queso, Salsa de Elote y Tomate
Venezuelan Cornmeal Biscuits Filled with Fontina Cheese, Grilled Corn and Tomato Salsa

Salmon Marinado en Panela, Locro, Saltado de Espinaca con Datiles
Caramelized King Salmon Filet, Squash-Goat Cheese Purée,
Spinach Sauteed with Medjool Dates

Puerco a la Parilla, Puree de Papa Dulce, Chutney de Fruta Seca al Pisco
Grilled Adobo Rubbed Pork Loins, Sweet Potato Purée,
Pisco Marinated Dried Fruit Chutney

(Vegetarian Entrée)
Capon de Auyama con Queso Fresco, Salsa de Zanahoria
Acorn Squash Filled with Achiote Grilled Eggplant and Portobello,
Fresh Cheese, Carrot Couli

Ensalada de Quinoa y Jicama
Yuca Fries

Coffee and Tea
Dessert Sampler

COST:
$52 people/$35 students; includes dinner, limited wine, tip, and tax. Payment requested before 21 November 2003. See reservation form below.
Payment: PayPal to durham1@llnl.gov, or checks payable to "PPEM". Non-U.S. participants unable to pay by check may reserve now, and pay Bill Durham at the AGU meeting.
SPECIAL NOTE:
Seating is strictly limited to 60 persons. Reserve early, and send
confirmation/payment promptly to Bill Durham.

2003 PPEM Dinner reservation form.

Reservations must be made and payments received before 21 November 2003. Send this form or reasonable facsimile
by e-mail to: durham1@llnl.gov or make a hardcopy and send by posted mail to the address below. Seating is strictly
limited to 60 persons, and reservations will be made on a first come, first served basis. U.S. participants not securing
reservations with payment by November 21 will be mercilessly dropped from the reservations list and replaced by the
next eager stand-by. Foreign participants unable to send payment will be prompted by Bill Durham for a statement of
reconfirmation on or about November 21.

Please reserve:

_______ places at $52.00 each
_______ student places at $35.00 each

Payment: (due 21 Nov 03)

_______ I am mailing a check made out to "PPEM"
        Please do not make checks out to Bill Durham!!

to:    W. B. Durham, L-201
        UCLLNL
        P.O. Box 808
        Livermore, CA 94550
        USA

_______ I will pay by PayPal https://www.paypal.com/
        Recipient's Email: durham1@llnl.gov
        Type: Quasi-cash
        Subject: 2003 PPEM dinner
        Note: your name

(Since PPEM does not have a business account, we can NOT accept credit card payment. You must establish your
own PayPal cash account, which takes about two weeks)

_______ I will pay Bill Durham at the AGU meeting BEFORE the dinner
        and will reconfirm by email or phone when prompted by email on or about 21 Nov 03.
        (please: non-U.S. residents only)

Name: ______________________________________
Affiliation: ________________________________

Other information, comments, special dietary requests, etc:

__________________________________________